Dual-Sourcing Vs. Sole Sourcing
for
Building Automation Controls

State of Washington GA Conference
November 2, 2005
Tacoma, WA

Topics

- History, Standards, & Capabilities of Open Systems

- BACnet & LonMark: Is BACnet always the best choice?

- Dual-Source Purchasing: 2003 Case Study – City of Seattle

- Installing a New System or Upgrading Your Existing Proprietary System.

2

History

- 1980's Pneumatic → DDC

- Proprietary only viable DDC system originally

- Price Gouging a major impetus for ASHRAE to begin development of Open Systems Protocol → BACnet
  - Also Interoperability, Communication, and Standardization

- Parallel to this was LonWorks development. In some ways an effort on the part of Proprietary manufacturers to compromise
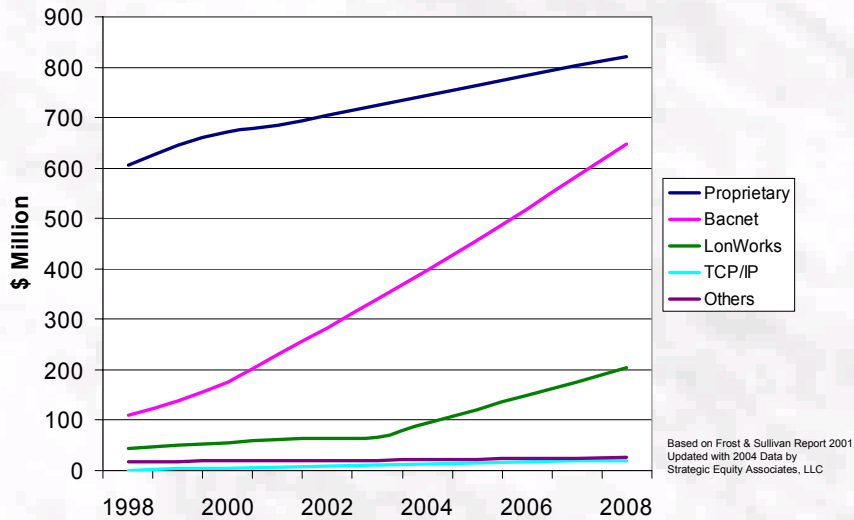

Current Standards Of Interest, Issues & Aims

Certification	BACnet	LonMark / LonWorks
ASHRAE	135-2001, 2004	
European	EN/ISO 16484-5	
ANSI/EIA/CEA	135-2001, 2004	EIA/CEA 709.1b, 709.3, 709.2, 852
Testing Standards	135.1 (ASHRAE) BTL Certification	LonMark Certification
Other	ISO 16484-5, KS X 6909	

- Quality
- Interoperability
- "Replace-ability"

BAS Protocols Market: Forecasts by Technology (NA)1998 - 2008

Legend: Proprietary, Bacnet, LonWorks, TCP/IP, Others

Based on Frost & Sullivan Report 2001
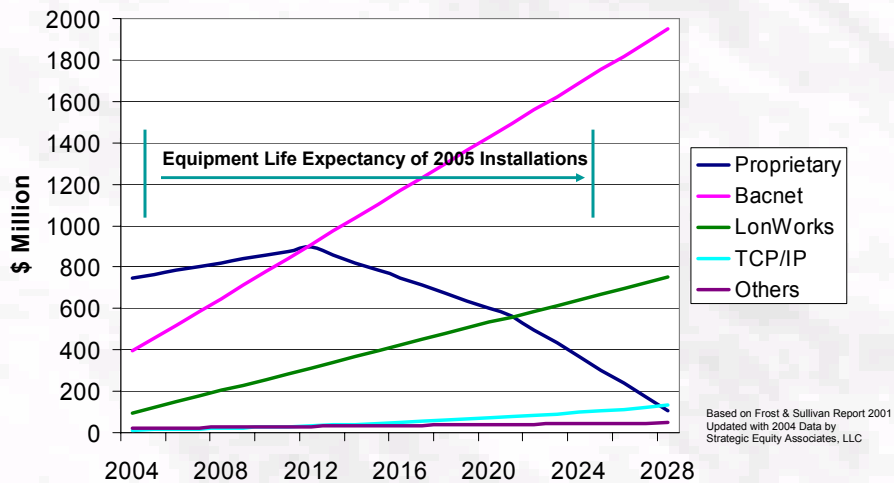Updated with 2004 Data by
Strategic Equity Associates, LLC

"BACnet currently has a 4 to 1 advantage over LonWorks in new systems installations"
"By 2008 as many BACnet systems will be installed as the total base of all proprietary systems"

6

BAS Protocols Market: Forecasts by Technology (NA) 2004 - 2028

Equipment Life Expectancy of 2005 Installations

Legend: Proprietary, Bacnet, LonWorks, TCP/IP, Others

Based on Frost & Sullivan Report 2001
Updated with 2004 Data by
Strategic Equity Associates, LLC

Within 10 years BACnet systems will be the majority system of choice.
Within 25 years BACnet systems will represent 75% of all installed BAS.

8

OP Systems Are Impacting Efficiency, Management, & Conservation

- Data Interchange

- Remote Management

- Value Added Services

- Resource Sharing

- Conservation

- Training

- Inventory

- IAQ

- Easy Implementation of "State of the Art" Equipment

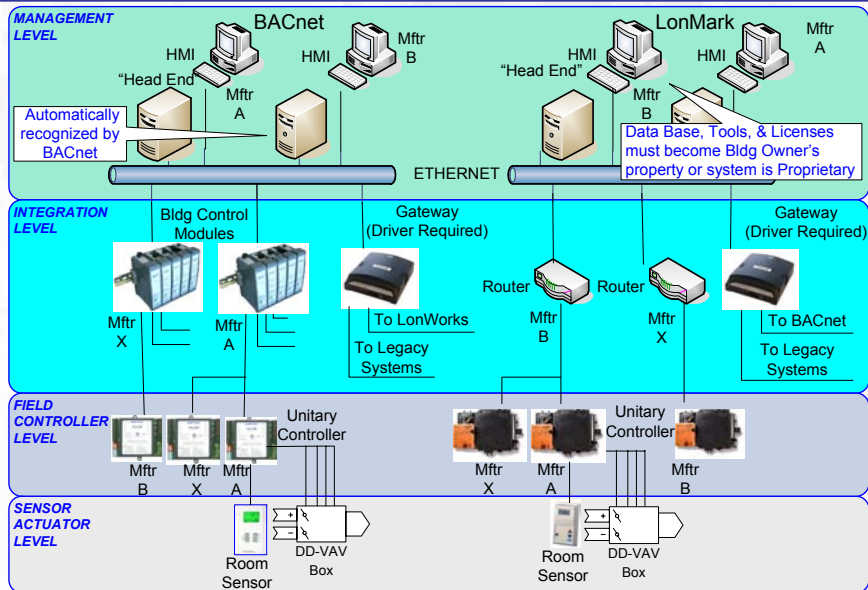- Future → Wireless Remodels

9

Latest Technologies For Low Cost Vendor Neutral BAS

- **BACnet**
  - HMI programming essentially <u>automatic</u>
  - Network data available to multiple systems <u>automatically</u>
- **LonMark**
  - HMI requires <u>significant additional programming</u>
  - Network data available to multiple systems with <u>significant programming overhead</u>

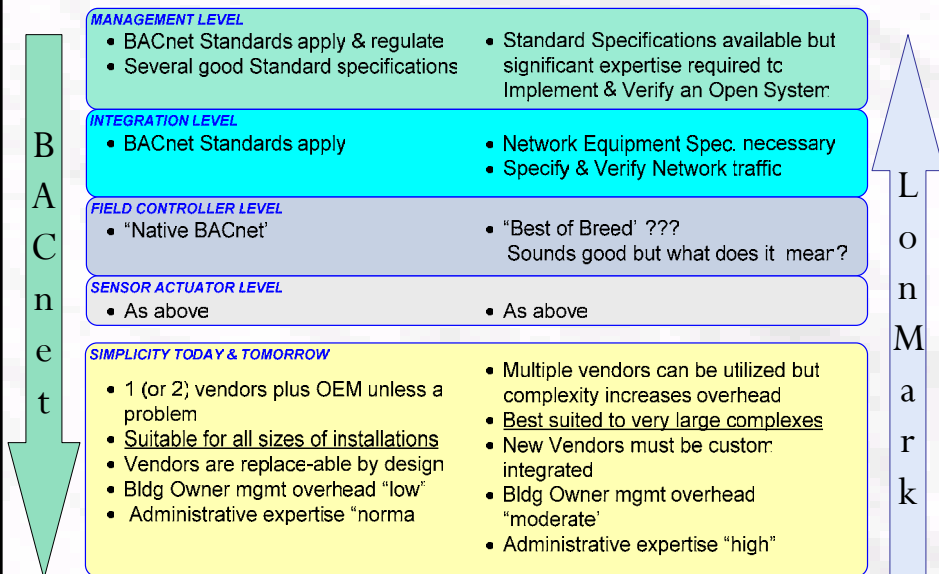- **Web Based (Intra/Internet)**

- **Gateways**

- **Modbu**s

13

How BACnet and LonMark Integrate Vendor Neutral Systems

MANAGEMENT LEVEL
BACnet — HMI "Head End", HMI, Mftr A, Mftr B
LonMark — HMI "Head End", HMI, Mftr A, Mftr B

Automatically recognized by BACnet

Data Base, Tools, & Licenses must become Bldg Owner's property or system is Proprietary

ETHERNET

INTEGRATION LEVEL
Bldg Control Modules — Mftr X, Mftr A
Gateway (Driver Required) — To LonWorks, To Legacy Systems, Mftr B
Router, Router
Mftr X
Gateway (Driver Required) — To BACnet, To Legacy Systems

FIELD CONTROLLER LEVEL
Mftr B, Mftr X, Mftr A — Unitary Controller
Mftr X, Mftr A — Unitary Controller, Mftr B

SENSOR ACTUATOR LEVEL
Room Sensor, DD-VAV Box
Room Sensor, DD-VAV Box

14

The Case For Simplicity: BACnet or LonMark?

B A C n e t →

MANAGEMENT LEVEL
- BACnet Standards apply & regulate
- Several good Standard specifications

- Standard Specifications available but significant expertise required to Implement & Verify an Open System

INTEGRATION LEVEL
- BACnet Standards apply

- Network Equipment Spec. necessary
- Specify & Verify Network traffic

FIELD CONTROLLER LEVEL
- "Native BACnet"

- "Best of Breed" ???
  Sounds good but what does it mean?

SENSOR ACTUATOR LEVEL
- As above

- As above

SIMPLICITY TODAY & TOMORROW
- 1 (or 2) vendors plus OEM unless a problem
- Suitable for all sizes of installations
- Vendors are replace-able by design
- Bldg Owner mgmt overhead "low"
- Administrative expertise "norma

- Multiple vendors can be utilized but complexity increases overhead
- Best suited to very large complexes
- New Vendors must be custom integrated
- Bldg Owner mgmt overhead "moderate"
- Administrative expertise "high"

← L o n M a r k

16

Use Open Protocol Systems To Avoid Proprietary "Lock"

- Problem #1: Installing New System
  - Minimum Bldg Owner overhead?
  - "Replace-able" vendors or Interchangeable parts?

- Problem #2: Integrate to Existing System
  - Maintain existing long-term relationship
  - Move towards the future
  - Minimum Bldg Owner overhead
  - Minimum complexity for Staff
  - Minimum System Hierarchy
  - *Dual-Source?*
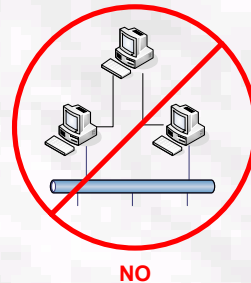
NO

18

2003 Study for City of Seattle

- **Reason:**
  - **High and escalating cost of Proprietary Controls**
- Study Topics:
  - Verify the Sole-Source Provider's Gross Margin %
  - Compare to standards for Industry
  - Approximate excess costs on recent jobs & bids
  - Rough comparison of price to market

19

Approximate excess costs on recent City Projects & Bids
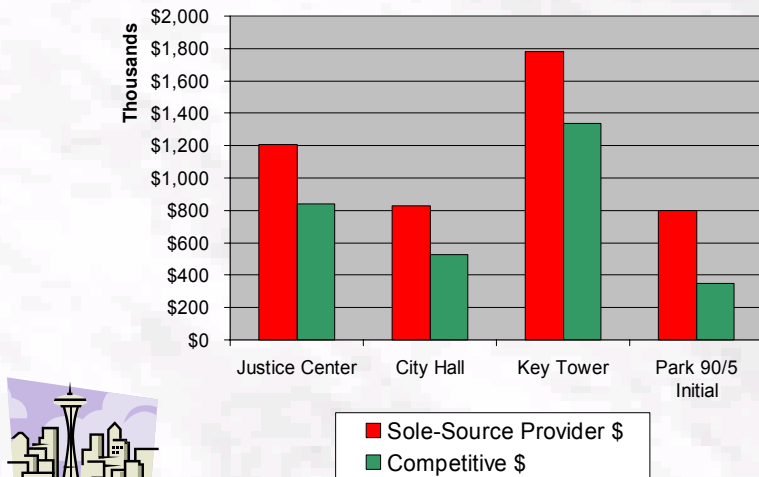
51% Above Competition! $1.5 Million!

In Summary: 2003 City of Seattle Study

- **Verify Sole Source Provider's Gross Margin**
  - **Historically up to 45%, currently 38% is a reasonable estimate (to City after pressure was applied)**
- **Compare to standards for Industry**
  - **Industry standard for competitive bid work 14 – 28%**
  - **Industry standard for negotiated work 26 – 35%**
- **Approximate excess costs on recent jobs**
  - **On $4,617,000 of bids, excess costs were $1,564,000**
- **Rough comparison of price to market**
  - **25% to 51% above market price**

Options??? Audit? Change Vendor? Dual Source?

Industry Consensus: Proprietary Controls Provider Pricing

With and Without Competition

Chart columns (left to right): Proprietary Left Alone, Proprietary With Max. Pressure, Proprietary Competitive Bid, Standard Vendor Competitive, Proprietary To "Invest", Std Vendor To "Invest"

Y-axis: Total Cost in $1000 (0 to 1200)

Percentages below columns: 45%, 35%, 25%, 25%, 0%, 6%

Percentage = Margin Overhead + Gross Profit

Legend: ■ Cost of Goods ■ Margin Overhead ■ Gross Profit
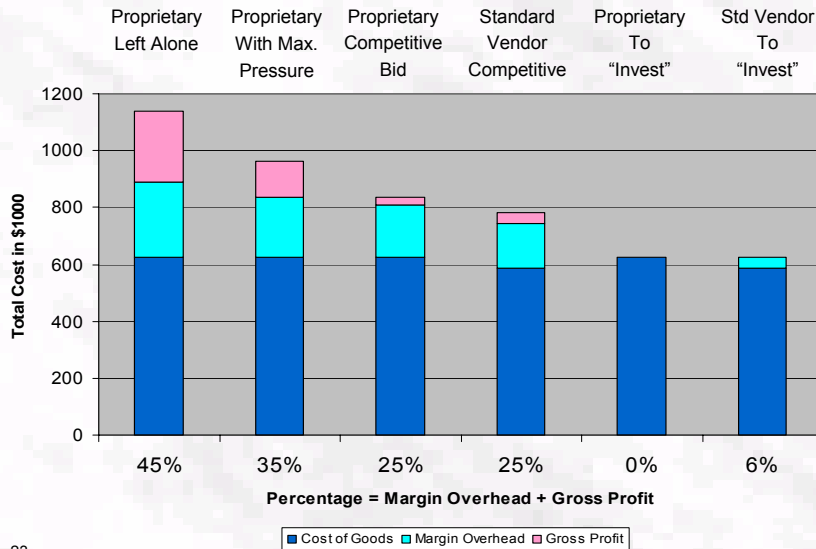
23

Are These One-time Costs or do they Continue?

Basis for City of Seattle's Decision:
- Single Facility or Multiple Buildings?
- Normal Growth or Steady State?
- Major Maintenance & Upgrades?
- Preventative Maintenance and Service?

Your Situation?

24
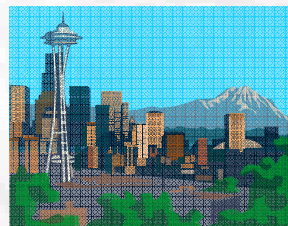
Annual Controls Expenditures For Typical Installation With Multiple Buildings

Major Maintenance & Upgrades

Normal Maintenance

New Construction

TRAINING

Year

25
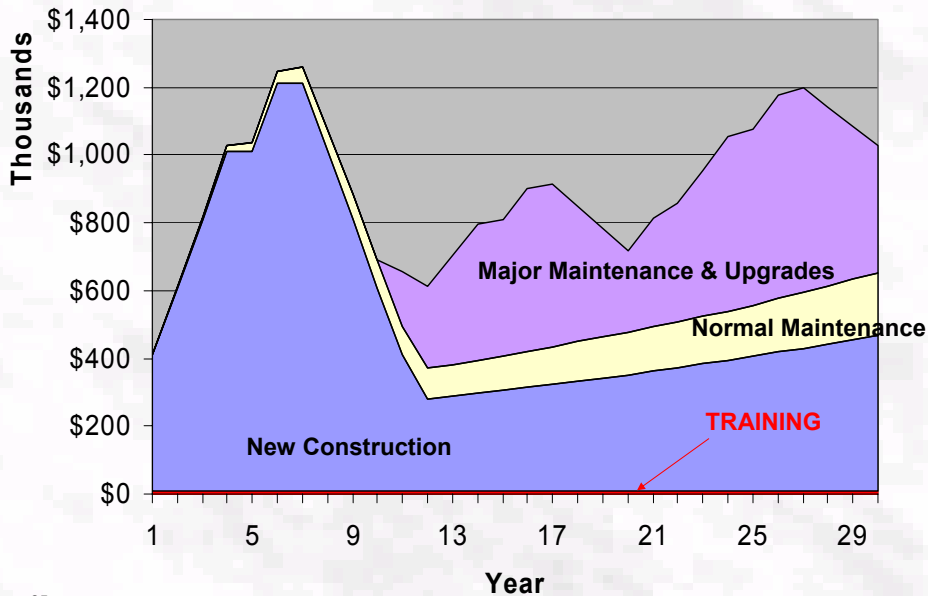
Alternatives to Sole-Sourcing

Market

# of Vendors

Cost
Complexity
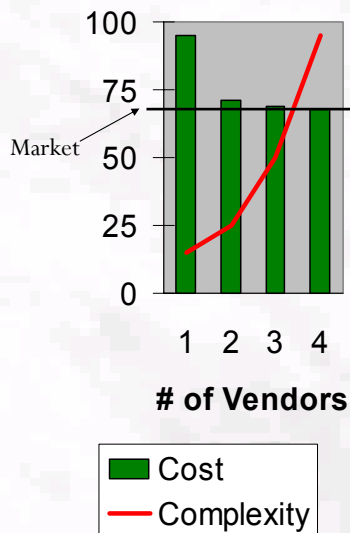
- Competitive Bidding
- Sole-Sourcing with Independent Audit
- Replace Current Vendor by Competitive Bid
- Dual-Sourcing
  - Pros
    - Pricing at or near market -- "Policing" not required.
    - High Quality easily achievable
    - Training, Maintenance, Inventory & Supply easily manageable
    - Redundant solutions.
  - Cons
    - Minor increase in complexity

26

If Two then Who? What We Wanted at the City of Seattle
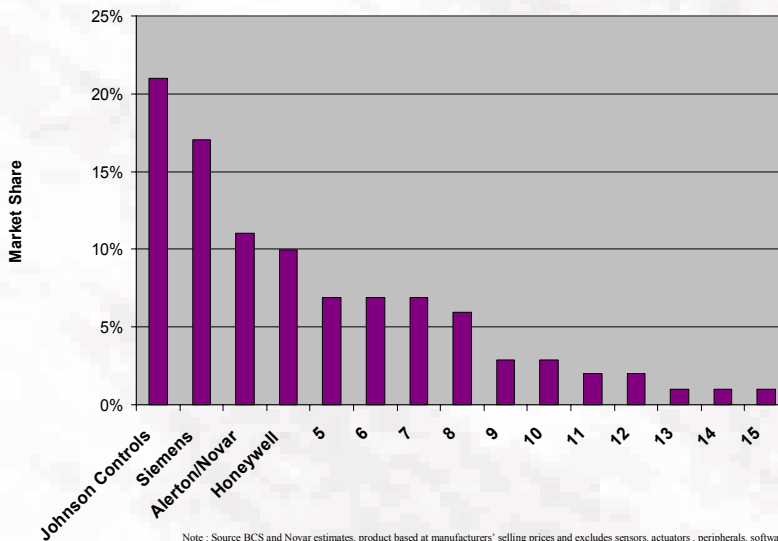
- <u>Price challenger</u> to current controls provider
- One of top controls suppliers in North America
- Innovation and Flexibility
- High quality local organization growing for the future
- Long Term Commitment - Service & Support
- Cost Effective Product & Installation
- BACnet Interoperability & ASHRAE Standard
- Unlimited Software License

27

North American Building Automation Controls Market

Market Share chart with bars: Johnson Controls ~21%, Siemens ~17%, Alerton/Novar ~11%, Honeywell ~10%, 5 ~7%, 6 ~7%, 7 ~7%, 8 ~6%, 9 ~3%, 10 ~3%, 11 ~2%, 12 ~2%, 13 ~1%, 14 ~1%, 15 ~1%

Note : Source BCS and Novar estimates, product based at manufacturers' selling prices and excludes sensors, actuators , peripherals, software, labor, maintenance and service. Total BCS market estimated at US$375m in 2001 Total market for building controls products and services, (ie. Including all the above) was US$3,425m

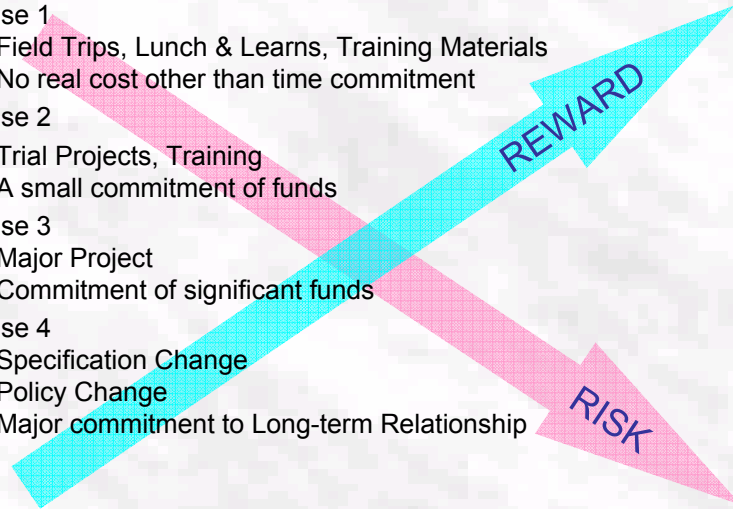28

City Of Seattle Decision Process For 2nd Vendor Selection
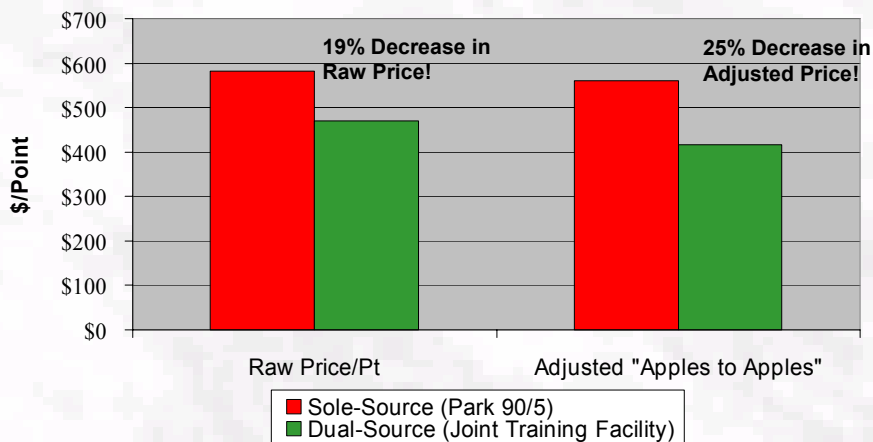
Incremental Commitment

- Phase 1
  - Field Trips, Lunch & Learns, Training Materials
  - No real cost other than time commitment
- Phase 2
  - Trial Projects, Training
  - A small commitment of funds
- Phase 3
  - Major Project
  - Commitment of significant funds
- Phase 4
  - Specification Change
  - Policy Change
  - Major commitment to Long-term Relationship

REWARD

RISK

30

City of Seattle Results: Proprietary Controls Provider Price Reduction

19% Decrease in Raw Price!

25% Decrease in Adjusted Price!

$/Point (y-axis: $0, $100, $200, $300, $400, $500, $600, $700)

Raw Price/Pt   Adjusted "Apples to Apples"

- ■ Sole-Source (Park 90/5)
- ■ Dual-Source (Joint Training Facility)

31

11

A Capability Rich System That Allows Migration to the Future!!

32
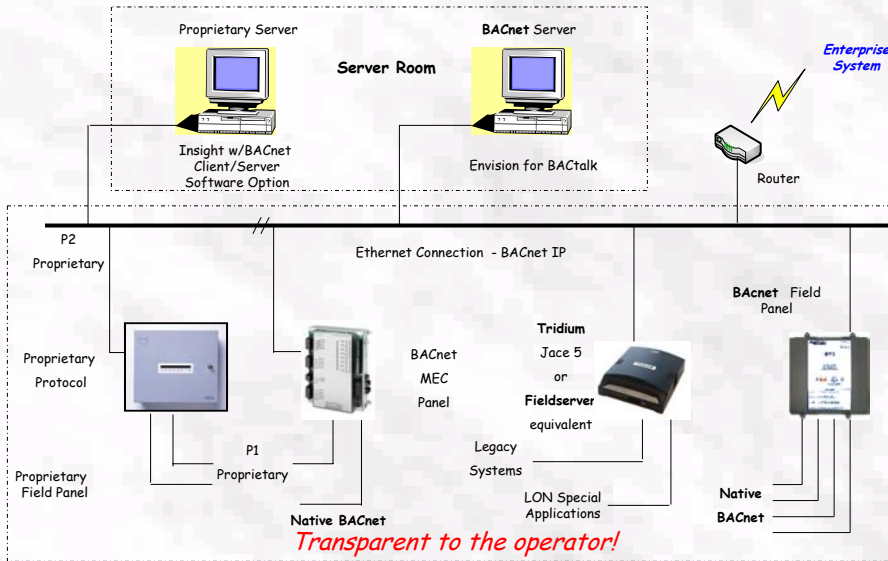
Where Are You Going? What Are You Paying?

- Paradigm Shifts
  - 1980's   Pneumatics → DDC

  - NOW   Proprietary → Open Systems
                       Sole-Source → Dual-Source
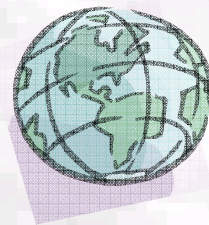
In the past two years I have found numerous Municipalities, Institutions, School Districts, Hospitals, and Laboratories in a similar situation.
  - No clear plan for Growth
  - "Locked-In" Pricing

33

New System: What Choices Should You Make?

Steps --

- Replaceable vendors or interchangeable parts?
- Capabilities of vendors and their pricing history?
- How best to limit the "real-world" complexity?
- What are my staff's capabilities?

(BACnet is usually the simplest path to real economic benefit)

34

Existing System: What Choices Should You Make?

Steps --

- What are <u>you</u> paying compared to the market?
- Change your specifications ~ Require Open Protocol
- Negotiate diligently with your current vendor
- <u>If a substantial Price Difference still exists, then Dual Source</u>
  - *A logical first step in many situations also.*

35

Action Plan / Summary

New Complex or Full Replacement

1. System Size?

2. Pre-qualify bidder(s) by RFP

3. When you specify BACnet, specify "Native BACnet"

Connect to Existing Proprietary System

1. Can existing long-term relationship be maintained?

2. Specify "Existing Proprietary and/or Native BACnet"

3. Dual-Source, don't go back to Competitive Bid

4. Develop a Growth Plan
5. Minimize Complexity & Bldg Owner Overhead
6. Choose a Major North American Supplier - They'll still be here in 10 years!

36

Which Direction?

- Open Protocol

- Native BACnet

- Dual Source

Future

37

Thank You

Questions?

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